Homework III (due: 04/08/2015)

CIS 5636 Ad Hoc Networks

Name ————————————- Student Number ————————————-

1. **Concept**
   (Ref: J. Carle and D. Simplot-Ryl, IEEE Computer 2005.)

   - Explain the similarities and differences between *trust* and *reputation*. Use one or two examples to illustrate.
   - Discuss the similarities and differences between *area coverage* and *point coverage*.

2. **Utility-based routing**
   (Ref: M. Lu and J. Wu, Social Welfare Based Routing in Ad Hoc Networks, ICPP 2006.)

   Given a network of four nodes: $S, 1, 2$, and D. The corresponding links with the associated cost/reliability values are the following: $(S, 1) : 1/05$, $(1, D) : 7/09$, $(1, 2) : 2/0.6$, $(S, 2) : 4/0.8$, and $(2, D) : 3/0.7$.

   - Find all paths from S to D.
   - Determine the most (and least) reliable path from S to D.
   - Determine the most (and least) costly path from S to D.
   - Determine the highest (and lowest) utility path from S to D if the benefit value of the packet is 20.

3. **Coverage and Exposure Problems**
   (Ref: S. Meguerdichian, Coverage Problem in Wireless Ad-Hoc Sensor Networks, INFOCOM 2001.)

   Given four points, $(1, 1)$, $(3, 5)$, $(5, 2)$, and $(4, 4)$, in a square region with four corners $(0, 0)$, $(0, 6)$, $(6, 0)$, and $(6, 6)$.

   - Find the Voronoi diagram.
   - Find the corresponding Delaunay triangulation.
   - Determine the maximal breach path from $(0, 0)$ to $(6, 6)$.
   - Determine the maximal support path from $(0, 0)$ to $(6, 6)$.

4. **Clusterhead**

   Write a C or Java code and show two running results of LEACH on a sensor network with 50 nodes with $p = 0.1$ (i.e., there are average 5 sensors selected as clusterheads in each round). Each run includes 25 rounds. Show both code and running results (clusterhead sequences).

5. **Subjective Logic**

   Suppose Beta distribution is used in the Bayesian inference. From A to B (and from B to C), we have $\alpha = 10$ and $\beta = 10$ (and $\alpha = 20$ and $\beta = 20$).

- Find out the corresponding belief (b), disbelief (d), and uncertainty (u).
- Derive indirect opinion of A on C, through A on B, and B on C.